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13. ABSTRACT Provides guidance for the preparation of test plans to evaluate the operational and performance characteristics of photographic equipment. Designates procedures for pre-operational inspection, operator training and familiarization, photographic coverage, physical characteristics, safety, performance tests for lens, cameras, and processing equipment, environmental testing, transportability, human factors evaluation, reliability, durability, maintenance evaluation and value analysis. Discusses data required and analytical plans. <u>Not applicable</u> to service testing or environmental testing at climatic test sites.			

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U.S. ARMY TEST AND EVALUATION COMMAND
SYSTEM ENGINEERING TEST OPERATIONS PROCEDURES

AMSTE-RP-702-109

*Test Operations Procedure 10-2-130

1 December 1971

PHOTOGRAPHIC EQUIPMENT

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SECTION I
GENERAL

1. Purpose and Scope. This TOP describes test procedures for evaluating the operational and performance characteristics of photographic equipment. Equipment covered includes: motion and still cameras, copying cameras, enlargers, film and print processors and driers, and illumination devices. From the tests listed in Section II, the test director can select those that will satisfy the requirements for the particular test item and the particular test type (i.e., engineering test, initial production test, etc.). This document provides for simulated environmental testing but does not include service testing or environmental testing at climatic test sites.

2. Background. Photographs provide permanent visual records of events and scenes and are useful in many military applications. Visual phenomena are recorded as images on chemically prepared film or negatives through the use of camera equipment and chemical processing. Reproduction is accomplished by the use of copy cameras, enlarging equipment, contact printers, and lithographing and printing techniques. To produce or obtain satisfactory results the operation and performance of photographic equipment, including processing and printing equipment, must be consistent and standard.

*This TOP supersedes MTPs 10-2-121 (18 March 1969), 10-2-131 (11 Jul 69), 10-2-132 (16 Apr 69), 10-2-133 (13 Jun 69), and 10-2-135 (28 Nov 69), including all changes.

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3. Equipment and Facilities. In addition to the equipment and facilities defined in the documents listed in Section II, a test target with reference point markings is required to perform the procedures defined by paragraph 5.

SECTION II TEST PROCEDURES

4. Supporting Tests. Common Engineering MTPs/TOPs, Military Standards, the tests defined in Section III, and other published documents to be considered in formulating a test plan are as follows:

TEST SUBJECT TITLE	PUBLICATION NO.
a. Preoperational Inspection	10-3-500
(1) Operator Training & Familiarization	10-2-501
(2) Photographic Coverage	7-3-519
b. Physical Characteristics	10-2-500
c. Safety	10-2-508
d. Performance Tests	
(1) Lens, General	MIL-STD-150A
(a) Resolution	Methods 11 thru 14
(b) Distortion	Methods 25 thru 29
(c) Equivalent Focal Length	Para 5.1.2.16.7 Methods 1, 1A, 2 ANSI PH3.35-1960
(2) Cameras, General	
(a) Shutter	ANSI PH3.2-1952 PH3.4-1959
(b) Shutter Synchronization	PH3.18-1957
(c) Flash Units	PH3.40-1962
(d) Range Finder Focusing	PH3.20-1968
(e) Viewfinder (Refer to para 5)	
(f) Light Leakage	MIL-C-12131B Para 4.10
(g) Film Scratch-Still	MIL-C-55019 Para 4.12



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<u>TEST SUBJECT TITLE</u>	<u>PUBLICATION NO.</u>
Film Scratch-Motion	MIL-C-25762A Para 4.5.1.2.6
(3) Camera, Motion	
(a) Film Advance Speed	MIL-C-12131B Para 4.11
(b) Steadiness	Para 4.12
(4) Camera, Copying	MIL-C-11971C Paras 4.5.2.2, 4.5.2.3, 4.5.2.6, 4.5.2.7
(5) Processing Equipment	
(a) Processing Machine Photographic Film & Paper	MIL-P-55159 Paras 4.8, 4.14, 4.16 MIL-P-55037B Para 4.5
(b) Contact Printer	ANSI PH3.45-1970
(c) Projection Printer	PH3.31-1958
e. Environmental Testing	
(1) Temperature	AR 70-38
(2) Sunshine	4-2-826
(3) Rain	2-2-815
(4) Humidity	4-2-820
(5) Fungus	4-2-818
(6) Salt Fog	MIL-STD-810B Method 509
(7) Dust Test	Method 510
(8) Leakage (Immersion) (Cameras)	Method 512
(9) Vibration	4-2-804
(10) Rough Handling	4-2-602
f. Transportability	
(1) Road, Rail, Marine	10-2-503
(2) Air	7-2-515
g. Human Factors Evaluation	10-2-505
h. Reliability	MIL-STD-781B Para 5
i. Durability	10-2-502
j. Maintenance Evaluation	10-2-507

TEST SUBJECT TITLE
k. Value Analysis

PUBLICATION NO.
USAMC SUPPL 1
to AR 11-26

SECTION III
SUPPLEMENTARY INSTRUCTIONS

5. Viewfinder.

a. Objective. To determine that the area viewed through the viewfinder correlates to the area exposed on the film emulsion.

b. Method. A target is provided with ample markings so that the area viewed through the viewfinder can be adequately measured. Initially, the camera is located at the minimum focusing distance and the target viewed through the viewfinder. The limits of the area covered are measured and recorded. The target area is photographed and the recorded viewfinder area limits compared with the area exposed on the photograph. This procedure is repeated for object distances of 1, 2, 3, 5, 8 and 10 meters.

c. Data Required.

- (1) Nomenclature of test item.
- (2) Dimensions obtained by viewfinder for each object distance.
- (3) Dimensions indicated on photograph for each object distance.

d. Analytical Plan. The dimensions of viewfinder and photograph for each object distance are tabulated and compared to determine the viewfinder error.

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Recommended changes to this publication should be forwarded to Commanding General, U.S. Army Test and Evaluation Command, ATTN: AMSTE-PA-M, Aberdeen Proving Ground, Maryland 21005. Technical information related to this publication may be obtained from the preparing activity, Commanding Officer, Aberdeen Proving Ground, ATTN: STEAP-MT-DM, Aberdeen Proving Ground, Maryland 21005. Additional copies of this document are available from the Defense Documentation Center, Cameron Station, Alexandria, Virginia 22314. This document is identified by the accession number (AD NO.) printed on the first page.

APPENDIX
REFERENCES

1. AR 70-38, "Research, Development, Test, and Evaluation of Materiel for Extreme Climatic Conditions."
2. USAMC Supplement 1 to AR 11-26, "Value Engineering."
3. MIL-STD-150A, "Photographic Lenses", including changes 1 and 2.
4. MIL-STD-781B, "Reliability Tests: Exponential Distribution."
5. MIL-STD-810B, "Environmental Test Methods", including changes 1 thru 4.
6. MIL-STD-1241A, "Optical Terms and Definitions."
7. MIL-C-11971C "Camera, Copying, Lithographic, Mobile Process, 24- by 30-inch."
8. MIL-C-12131B, "Camera Set, Motion Picture KS-10", including interim amendment 1.
9. MIL-C-25762A, "Camera System, Motion Picture, KS-27A."
10. MIL-C-55019, "Camera, Still Picture KS-36."
11. MIL-P-55037B, "Processing Machine, Photographic Paper EH-5."
12. MIL-P-55159, "Processing Machine, Photographic Film and Paper", including amendment 2.
13. American National Standards Institute (ANSI).
 - a. PH3.2-1952 "Determining Performance Characteristics of Focal Plane Shutters used in Still Picture Cameras." Reaffirmed 1959.
 - b. PH3.4-1959 "Determining Performance Characteristics."
 - c. PH3.18-1957 "Classifying and Testing the Internal Synchronization of Front Shutters." 1957.
 - d. PH3.20-1968 "Measuring Distance Scales for Focusing Camera Lenses."
 - e. PH3.31-1958 "Testing Photographic Enlargers."

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APPENDIX (Continued)

f. PH3.35-1960 "Designating and Measuring Focal Lengths and Focal Distances of Photographic Lenses." 5 February 1960.

g. PH3.40-1962 "Measuring and Designating the Performance of Photographic Electronic Flash Equipment."

h. PH3.45-1970 "Uniformity Testing Photographic Contact Printers."